General maintenance guide for all equipment used in cotton testing laboratories

Guide de maintenance générale pourles équipements de laboratoires

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Plan of presentation

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1- Introduction

- Maintenance: factor influencing test results
- Plan a maintenance activity on:
  - all the testing instruments of the laboratory (SITC)
  - its Air Management System equipment (AMS)
- ISO 17025: improvements → preventive and corrective actions
- Preventive maintenance = keep the equipment working (+extend its life)
- Corrective maintenance = make the equipment work again after failure

- Maintenance: facteur pouvant influencer les résultats des tests
- Planifier une maintenance sur :
  - tous les instruments de mesure du laboratoire (CMI)
  - le système de gestion du conditionnement d'air (CTA)
- ISO 17025: améliorations → actions préventives et correctives
- Maintenance préventive = maintenir l'équipement en fonctionnement (+rallonger sa durée de vie)
- Maintenance corrective = réparer l'équipement après une panne

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1- Introduction

- Preventive maintenance: highly recommended (cost often lower than estimated cost for waiting breakdown and repairing)

- Cost of failure takes into account many factors:
  - Time spent at a cost of labor technicians
  - Possible intervention of outside experts
  - Stock of Spare Parts
  - Loss of production during the shutdown
  - Penalties related to any delay in delivery
  - Loss of brand image

- Maintenance préventive : fortement recommandée (coût souvent moins élevé que le coût estimé de la panne et sa réparation)

- Coût de la panne prend en compte plusieurs éléments :
  - Temps passé par le techniciens
  - Intervention éventuelle d'experts extérieurs
  - Stock de pièces de rechange
  - Perte de productivité durant la panne
  - Pénalités dues aux retards de rendu résultats
  - Sensibilisation de l'image du labo

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Summary

Maintenance type	Preventive		Corrective
	Periodic: condition-monitoring tasks	**Predictive:** life-extending tasks	
Aim	Prevention from deterioration Maintain in satisfactory operating conditions	Prevent faults from occurring Prevent from failing Measure deterioration Identify problems	Repair Restore Replace
Who?	Personnel using the equipment daily + person in charge of maintenance	Person in charge of maintenance	Person in charge of maintenance / sub-contractor / manufacturer
When?	Periodic inspection, routine	Inspection to be scheduled regularly	After mechanical or electrical failure
What?	Care, servicing	Inspecting, diagnosis	Analysing and solving the problem
How?	Cleaning, adjusting, lubricating/oiling, testing	Inspecting, testing, and then correcting, adjusting and/or replacing parts	Parts replacement

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1- Introduction

2- Preventive maintenance

- **2.1- Periodic maintenance**
- **2.2- Predictive maintenance**
- **2.3- Signs of dysfunction**

3- Corrective maintenance

4- Conclusion

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2- Preventive maintenance

- *Aim*: Keeping equipment in good operating conditions and reliable + Avoid breakdown/dysfunction

- According to manufacturer's advice
- Check efficiency of equipment in routine → conclude reliable if ok
- Two levels:
  1. **periodic maintenance**
  2. **predictive maintenance**

- *But*: maintenir l'équipement en bonnes conditions et fiable + éviter panne/dysfonctionnement

- Selon les conseils du constructeur
- Contrôler l'efficacité de l'équipement en mode routine → juger fiable si ok
- Deux niveaux :
  1. **maintenance périodique**
  2. **maintenance prédictive**

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2- Preventive maintenance

2.1- Periodic maintenance

- *Aim*: prevent from deterioration (condition-monitoring)
- *Who*? well-trained personnel using the equipment daily + person in charge of maintenance
- *When*? daily + periodic inspections (daily, weekly, monthly or annually)
- *What*? cleaning, adjusting, oiling and testing any equipment in the lab
- *How*?
  - use pre-established follow-up forms
    - 1 form per laboratory (room)
    - 1 form per instrument
  - use maintenance books if necessary
  - use vacuum cleaner, brush, cleaning paper, lubricant, screwdrivers, measuring instruments…
- Check efficiency of equipment in routine → conclude reliable if ok

- *But*: empêcher la détérioration (surveillance de l'état machine)
- *Qui*? personnel habilité utilisant le matériel quotidiennement + responsable de la maintenance
- *Quand*? quotidien + périodique (quotidien, hebdomadaire, mensuel, annuel)
- *Quoi*? nettoyer, ajuster, graisser et tester tout équipement du labo
- *Comment*?
  - utiliser des fiches de suivi préétablies
    - 1 fiche par laboratoire (salle)
    - 1 fiche par instrument
  - utiliser les cahiers de maintenance
  - utiliser un aspirateur, des brosses, du papier de nettoyage, du lubrifiant, tournevis, instruments de mesure…
- Contrôler l'efficacité de l'équipement en mode routine → juger fiable si ok

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2- Preventive maintenance

2.2- Predictive maintenance

- *Aim*: prevent faults from occurring in the long-term (life-extending)
- *Who*? person in charge of maintenance
- *When*? scheduled regularly, even if less frequent than routine
- *What*? identify imminent troubles and bring solutions to prevent equipment from failing
- *How*? inspecting, testing and then correcting, adjusting and/or replacing parts

- *But*: empêcher les failles sur le long terme (rallonger la durée de vie)
- *Qui*? responsable de la maintenance
- *Quand*? à planifier régulièrement, moins fréquent que la routine
- *Quoi*? identifier les problèmes imminents et apporter des solutions pour éviter la panne
- *Comment*? inspecter, tester et corriger, ajuster et/ou remplacer des pièces

- Check efficiency of equipment in routine → conclude reliable if ok
- Report in appropriate maintenance books for traceability

- Contrôler l'efficacité de l'équipement en mode routine → juger fiable si ok
- Reporter l'action dans le cahier de maintenance approprié pour assurer la traçabilité

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2- Preventive maintenance

2.3- Signs of dysfunction

Maintenance

- Suspect or outside specified limits results OR item dysfunction sometimes only observed during preventive maintenance inspection
- Equipment cannot be considered as operational → reset/repair and prove reliable → operational again

SITC: Tests on well-known cottons

- CSITC Round Tests: opportunity to compare results with other labs
- Universal calibration standards (or internal standards): daily used
- Suspected SITC drifting or observed significant difference in the level → perform calibration (check)
- (make sure first it is not due to not well managed atmospheric conditions)

Maintenance

- Résultats suspects ou hors tolérances OU dysfonctionnement d'un module observé seulement lors de l'inspection de maintenance préventive
- Equipement ne peut pas être considéré opérationnel → ajuster/réparer et prouver la fiabilité → opérationnel

CMI : Tests sur cotons connus

- CSITC Round Tests: comparaison des résultats à ceux des autres labos possible
- Universal calibration standards (ou internes) : utilisé quotidiennement
- Soupçon de dérive ou observation de différence de niveau significative → réaliser un étalonnage (ou vérification)
- (s'assurer au préalable que cela ne provienne pas de difficultés de gestion des conditions atmosphériques)

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3- Corrective maintenance

- *Aim*: quickly restore the equipment and making it reliable again
- *Who*? person in charge of maintenance/subcontractor
- *When*? after a mechanical or electrical failure
- *What*? analysing the problem and solving it
- *How*?
  1. Report failure to chief of lab
  2. Provide info that will help finding the source of disruption
     - breakdown associated with noise?
     - with/without signal?
     - with burnt smell?
     - …?
  3. Search info from technical files (mechanical plans, electronic diagram, instrument settings…)

- *But*: réparer l'équipement et le rendre de nouveau fiable
- *Qui*? responsable de la maintenance/sous-traitant
- *Quand*? Après une panne mécanique ou électrique
- *Quoi*? analyser et résoudre le problème
- *Comment*?
  1. Rapporter la panne au chef du labo
  2. Fournir toutes les infos pour trouver l'origine de la panne
     - panne associée à un bruit?
     - à une alerte sonore/lumineuse?
     - à une odeur de brûlé?
     - …?
  3. Chercher des infos dans les docs techniques (plans mécaniques, diagramme électronique, réglages de l'instrument…)

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3- Corrective maintenance

4. Use measuring instruments such as a slide caliper, a multimeter, or an oscilloscope
5. Issue identified → use spare parts (mechanical parts, set of cards) and repair

- Check efficiency of equipment in routine → conclude repaired and reliable if ok
- Report in appropriate maintenance books for traceability

4. Utiliser des instruments de mesure tels que pied à coulisse, multimètre, oscilloscope
5. Problème identifié → utiliser des pièces de rechange (pièces mécaniques, jeu de cartes électroniques) et réparer

- Contrôler l'efficacité de l'équipement en mode routine → juger réparé et fiable si ok
- Reporter l'action dans le cahier de maintenance approprié pour assurer la traçabilité

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4- Conclusion

- In order to provide long term monitoring, all inspections done during preventive or corrective maintenance should be:
  - listed
  - recorded
  - archived every year

- In case additional disruptions would happen to the same device, gathered information should help evaluating and/or solving the situation

- Information could also be used as a model for resolution when a similar failure occurs to another device

- Afin de surveiller à long terme, toutes les inspections faites pendant la maintenance préventive ou corrective doivent être :
  - listées
  - enregistrées
  - archivées chaque année

- Au cas où d'autres pannes se produiraient sur la même machine, l'information recueillie permettrait d'évaluer et/ou de résoudre le problème

- L'information pourrait également servir de modèle à la résolution d'une situation semblable si elle se produisait sur une autre machine

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Résumé

Type de maintenance	Préventive		Corrective
	Périodique: tâches de surveillance	**Prédictive:** tâches pour rallonger la durée de vie	
But	Prévenir contre la détérioration Maintenir dans de bonnes conditions	Empêcher les failles Prévenir contre les pannes Mesurer la détérioration Identifier les problèmes	Réparer Restaurer Remplacer
Qui?	Personnel utilisant le matériel quotidiennement + responsable de la maintenance	Responsable de la maintenance	Responsable de la maintenance / sous-traitant / fabricant
Quand?	Inspections périodiques, routine	Inspections à prévoir régulièrement	Suite à une panne mécanique ou électrique
Quoi?	Entretenir, précautions	Inspecter, diagnostiquer	Analyser and résoudre le problème
Comment?	Nettoyer, ajuster, lubrifier/graisser, tester	Inspecter, tester, puis corriger, ajuster et/ou remplacer des pièces	Remplacement de pièces

All details in:

Tous les détails dans :

PAYET L., GOURLOT J-P., 2010, Rapport "General maintenance guide for all equipment used in cotton testing laboratories", Project CFC/ICAC/33, 14 p.

Thanks for your attention